

Work Order ID 62193

September 21, 2010 3:18:30 PM

Page 1

Item ID: D212-664-101TRN

Revision ID:

Item Name: Crosstube Turning Detail

Start Date: 9/21/10 Start Qty: 1.00

Required Date: 9/27/10 Req'd Qty: 1.00

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

QC:

Date:

SPC (Y/N):

Date:

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

Draw Nbr

Revision Nbr

D212-664-141

Rev D

100



Mori Seiki

Mori Seiki CNC Lathe Large

MORI SEIKI CNC LATHE LARGE

0.00

Memo

0.00

1-Fill tube with sand & install plugs DT8534 on both ends as per Folio FA113
2-Turn first side as per Folio FA113
3-File down transition lines smooth.

G.M 10-09-22 ①

110



QC

Quality Control

QC1- Inspect dimensions to dimension sheet

0.00

Memo

0.00

G.M 10-09-22 ②

120



Mori Seiki

Mori Seiki CNC Lathe Large

MORI SEIKI CNC LATHE LARGE

0.00

Memo

0.00

1-Turn second side as per Folio FA113
2-File down transition lines smooth.
3-Remove sand and plugs

G.M 10-09-22 ③

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: D212-664-101TRN PAR #: _____ Fault Category: X-tubes NCR: Yes No DQA: [Signature] Date: 10/12/09
 Resolution: Accepted Disposition: use as is QA: N/C Closed: [Signature] Date: 10/12/09

NCR: <u>62193</u>		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
10.12.08	10	Tube WD over by 0.015 - 0.020 along BOTH TAPERES, R.C. process	CP 10.12.08 QSI UPL	ACCEPTABLE PER ATTACHED CALC SHOWING TUBE IS STILL SUFFICIENTLY FLEXIBLE	NA 10.12.08	S 6/12/08	CP 10.12.08 QSI UPL	S 10/12/08

NOTE: Date & initial all entries

Work Order ID 62193

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Item Name: Crosstube Turning Detail

Start Date: 9/21/10 Start Qty: 1.00

Required Date: 9/27/10 Req'd Qty: 1.00

Reference:

Approvals:

Process Plan:

Date:

QC:

Date:

Tooling:

Date:

SPC (Y/N):

Date:

Run

Start

Stop

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

130

QC1- Inspect dimensions to dimension sheet

0.00



QC

Memo

0.00

Quality Control

140

QC8- Inspect parts - second check

0.00



QC

Memo

0.00

Quality Control

150

Crosstubes Chemical Conversion

0.00



HandFXtube

Memo

0.00

Hand Finishing Crosstubes

Accept



Setup

Start



Stop



Cust Item ID:

Customer:

Run

Start



Stop



2.2 10-09-22

Ph
Perrin P

Suhr/08



SAO

10-12-08



W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Work Order ID 62193

September 21, 2010 3:18:31 PM



Page 3

Item ID: D212-664-101TRN

Accept



Setup Start



Revision ID:

Stop



Item Name: Crosstube Turning Detail

Start Date: 9/21/10 Start Qty: 1.00



Cust Item ID:

Required Date: 9/27/10 Req'd Qty: 1.00



Customer:

Reference:

Run Start



Approvals: Process Plan:

Date:

Tooling:

Date:

Stop



QC:

Date:

SPC (Y/N):

Date:

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

160

QC3- Inspect Part Finish

0.00

DP

10-12-8



QC

Memo

0.00

Quality Control

170

Packaging

0.00



Packaging

Memo

0.00

Packaging

Identify and Stock in kanban rack
Location: LG

SAD
10-12-08

①

180

QC21- Final Inspection - Work Order Release

0.00



QC

Memo

0.00

Quality Control

10/12/09

CMF
10-12-08

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Picklist Print

September 21, 2010 3:18:28 PM

Page 1

Work Order ID: 62193

Parent Item: D212-664-101TRN

Parent Item Name: Crosstube Turning Detail



Start Date: 9/21/10

Required Date: 9/27/10

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A 08-03-06 new issue DD verified by:ec
IPP Rev B 08.04.02 removed Polish EC verified by: DD

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
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D6005-128

Manufactured No

120

Each

41.0000

1

1



am 10.09.22①

Crosstube Material

Location

Loc Qty

Loc Code

LG

41

53593

7

57911

34

1

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD	Work Order: 6243
Description: Crosstube Assembly (205/212/412 High Fwd)	Part Number: D212-664-141
Inspection Dwg: D212-664-141 Rev: D	Page 1 of 1

FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article ☐ Prototype

Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	0.200	+/-0.010	0.200	✓		
	R0.063	+/-0.010	R0.063	✓		
	2.740	+0.005/-0.000	2.740	✓		
	5.097	+/-0.030	5.097	✓		
	2.304	+0.005/-0.000	2.309	✓		
	2.340	+0.005/-0.000	2.345	✓		
	2.398	+0.005/-0.000	2.403	✓		
	2.448	+0.005/-0.000	2.453	✓		
	2.498	+0.005/-0.000	2.503	✓		
	2.549	+0.005/-0.000	2.554	✓		
	2.599	+0.005/-0.000	2.604	✓		
	2.671	+0.005/-0.000	2.676	✓		
	2.701	+0.005/-0.000	2.706	✓		
SIDE B	0.200	+/-0.010	0.200	✓		
	R0.063	+/-0.010	R0.063	✓		
	2.740	+0.005/-0.000	2.740	✓		
	5.097	+/-0.030	5.097	✓		
	2.304	+0.005/-0.000	2.309	✓		
	2.340	+0.005/-0.000	2.345	✓		
	2.398	+0.005/-0.000	2.403	✓		
	2.448	+0.005/-0.000	2.453	✓		
	2.498	+0.005/-0.000	2.503	✓		
	2.549	+0.005/-0.000	2.554	✓		
	2.599	+0.005/-0.000	2.604	✓		
	2.671	+0.005/-0.000	2.676	✓		
	2.701	+0.005/-0.000	2.706	✓		
	126.514	+/-0.020	126.510	✓		

Measured by: A.M.	Audited by: J.C. Hatch F&T	Prototype Approval:	N/A
Date: 10.09.22	Date: Sket for the Reel	Date: D.M.	N/A

Rev	Date	Change	Revised by	Approved
A	05.04.27	New Issue (P/O D412-664-101)	KJ/JLM	
B	06.03.15	Tolerance revised for 5.097 per Dwg Rev update	KJ/JLM	
C	07.05.28	Dwg Rev updated	KJ/JLM	
D	10.02.02	Dimension 126.514 was 126.51	KJ	

DART AEROSPACE LTD	Work Order:
Description: Crosstube Assembly (205/212/412 High Fwd)	Part Number: D212-664-141
Inspection Dwg: D212-664-141 Rev: D	Page 1 of 1

FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article ☐ Prototype

Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	0.200	+/-0.010	.200			
	R0.063	+/-0.010	R.063			
	2.740	+0.005/-0.000	2.748/2.745			
	5.097	+/-0.030	5.100			
	2.304	+0.005/-0.000	2.318			
	2.340	+0.005/-0.000	2.354			
	2.398	+0.005/-0.000	2.416			
	2.448	+0.005/-0.000	2.466			
	2.498	+0.005/-0.000	2.514			
	2.549	+0.005/-0.000	2.570			
	2.599	+0.005/-0.000	2.618			
	2.671	+0.005/-0.000	2.689			
	2.701	+0.005/-0.000	2.720			
SIDE B	0.200	+/-0.010	.200			
	R0.063	+/-0.010	R.063			
	2.740	+0.005/-0.000	2.748/2.745			
	5.097	+/-0.030	5.100			
	2.304	+0.005/-0.000	2.316			
	2.340	+0.005/-0.000	2.355			
	2.398	+0.005/-0.000	2.418			
	2.448	+0.005/-0.000	2.466			
	2.498	+0.005/-0.000	2.514			
	2.549	+0.005/-0.000	2.570			
	2.599	+0.005/-0.000	2.622			
	2.671	+0.005/-0.000	2.691			
	2.701	+0.005/-0.000	2.720			
	126.514	+/-0.020	126.500			

Measured by: JS	Audited by: E	Prototype Approval:	N/A
Date: 10/12/07	Date: 10/12/07	Date:	N/A

Rev	Date	Change	Revised by	Approved
A	05.04.27	New Issue (P/O D412-664-101)	KJ/JLM	
B	06.03.15	Tolerance revised for 5.097 per Dwg Rev update	KJ/JLM	
C	07.05.28	Dwg Rev updated	KJ/JLM	
D	10.02.02	Dimension 126.514 was 126.51	KJ	


DART

FOR $\phi 2.75 \times \phi 2.60$ TUBE, AN INCREASE OF
0.020" IN OD. EQUATES TO A 50% INCREASE IN
STIFFNESS ($I = 2.1045$ VS 2.0220).

PER TP-D212-664-2 RECD, STIFFNESS $M = 780$ FOR

DART D212-664-101, A $M = 864$ FOR OEM.

$780 \times 1.05 = 819 < 864$. \therefore DART TUBE
IS SUFFICIENTLY ~~STIFF~~ FLEXIBLE


10.12.08

Item	Qty -141	Qty -141B	Part Number	Description
1	X		D212-664-141	CROSSTUBE ASSEMBLY (205/212/412 HIGH FWD)
2		X	D212-664-141B	CROSSTUBE ASSEMBLY (214 HIGH FWD)
3	1	1	D6005-128	CROSSTUBE
4	2	2	D2893-1	SUPPORT
5	4	4	D3595-063-450	RUBBER CUSHION
6	4	4	MS21920-25	CLAMP (OR MS21920-26)
7	A/R	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6005-128
FINISHED LENGTH = 126.514±0.020
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D212-664-XXX" AND BATCH NUMBER ON INSIDE OF CUFF
USING VIBRATING STYLUS
- 7) WEIGHT: D212-664-141 = 33.6 lbs (PER IIN-D212-664)
D212-664-141B = 33.6 lbs (PER IIN-D212-664)
- 8) PART IS SYMMETRIC ABOUT CENTERLINE.
- 9) RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 3 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 12) INSTALL D2893-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2893-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 13) INSTALL MS21920-25 CLAMPS (OR -26) WITH D3595-063-450 RUBBER CUSHIONS TO SECURE THE D2893-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE SUPPORT.
- 14) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

D	REFORMAT/REVISE GENERAL NOTES/PART LIST; REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS; ADD -141B (ZN B4-2, D4-2); REMOVED REF & ADD TOLERANCES (ZN B4-3, C6-3, C8-3 & B6-3); RELOCATED FLAG #6 PER PAR 08-046 (ZN A5-3); MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4	RF	09.09.30
C	REMOVE -851 ABRASION STRIP; ADD MAGNOBOND 6398, CUSHION, REVERSE CLAMPS	PH	07.03.08
B	ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES	PH	05.02.04
A	NEW ISSUE	PH	00.12.12
REV.	DESCRIPTION	BY	DATE
DESIGN	PH	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	PH	DRAWING NO.	REV. D
MFG. APPR.	PH	D212-664-141	SHEET 1 OF 4
APPROVED	PH	TITLE	SCALE
DE APPR.	PH	XTUBE ASS'Y (205/212/412 HI FWD)	NTS
DATE	09.09.30	COPYRIGHT © 2000 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

12 13 15
D2893-1 SUPPORT
MS21920-25 CLAMP, 2X
D3595-063-450 RUBBER CUSHION, 2X
2 PL

A4-2

14.00 (-141)
OR 13.75 (-141B)

D212-664-501
BENT TUBE

SYM

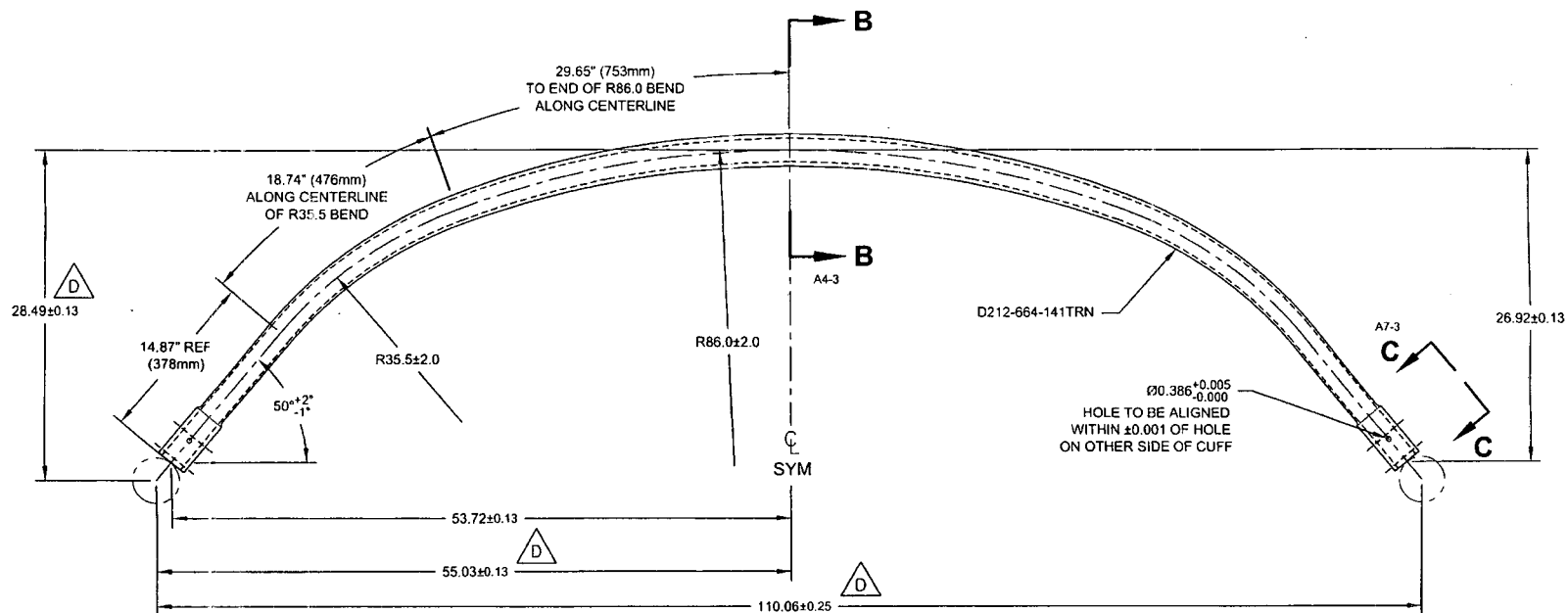
D212-664-141/-141B
ASSEMBLY DETAIL

D2893-1
SUPPORT, REF
12
APPLY MAGNOBOND
BETWEEN D2893-1 AND
CROSSTUBE
D3595-063-450
RUBBER CUSHION
UNDER CLAMP, REF
13 15
MS21920-25
CLAMP, REF

SECTION A-A D5-2
SCALE 4X

RELEASED
2009-10-29

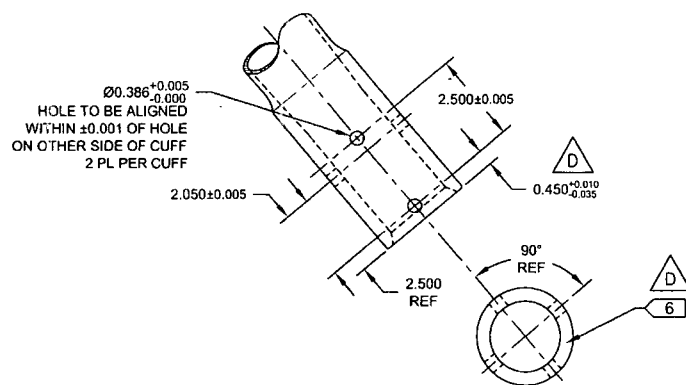
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DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	Q	DRAWING NO.	REV. D
MFG. APPR.	DS	D212-664-141	SHEET 2 OF 4
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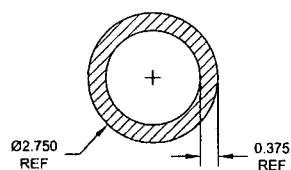
D212-664-501
BENDING AND DRILLING DETAIL



62193



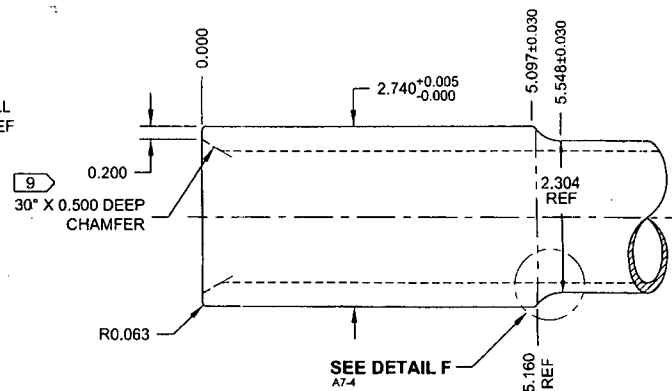
VIEW C-C: CUFF DETAIL
SCALE 3X



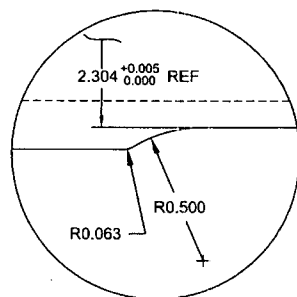
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SCALE 4X

RELEASED
2009-10-29
MP

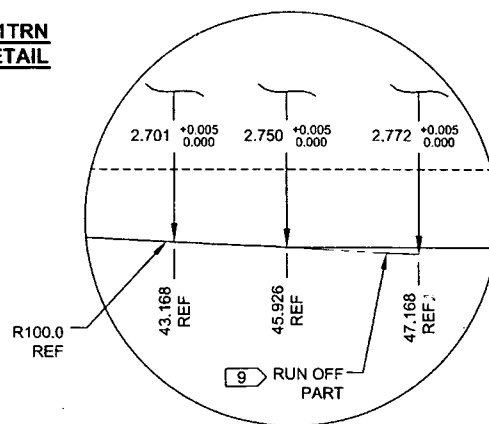
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DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	JP	DRAWING NO.	REV. D
MFG. APPR.	JS	D212-664-141	SHEET 3 OF 4
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DETAIL D:
CROSSTUBE CUFF D8-4
SCALE 5X



DETAIL F:
CUFF TRANSITION C2-4
SCALE 10X



DETAIL E:
TAPER RUN-OFF C5-4
NOT TO SCALE

RELEASE
2009-10-29

DESIGN	PH	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	QF	DRAWING NO.	REV. D
MFG. APPR.	DS	D212-664-141	SHEET 4 OF 4
APPROVED	PH	TITLE	SCALE
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